

## SEQUENCE LISTING

<110> STEELE, Christopher L.  
DIXON, Richard A.

<120> GENETIC MANIPULATION OF ISOFLAVONOIDS

<130> 11137/05006

<140> PCT/US00/05915

<141> 2000-08-03

<150> 60/123,267

<151> 1999-03-08

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<170> PatentIn Ver. 2.1

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Leu Gly Leu Leu Val Leu Ala Leu Phe Leu His Leu Arg Pro Thr Pro
              10              15              20

act gca aaa tca aaa gca ctt cgc cat ctc cca aac cca cca agc cca      149
Thr Ala Lys Ser Lys Ala Leu Arg His Leu Pro Asn Pro Pro Ser Pro
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Lys Pro Arg Leu Pro Phe Ile Gly His Leu His Leu Leu Lys Asp Lys
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ctt ctc cac tac gca ctc atc gac ctc tcc aaa aaa cat ggt ccc tta      245
Leu Leu His Tyr Ala Leu Ile Asp Leu Ser Lys Lys His Gly Pro Leu
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ttc tct ctc tac ttt ggc tcc atg cca acc gtt gtt gcc tcc aca cca      293
Phe Ser Leu Tyr Phe Gly Ser Met Pro Thr Val Val Ala Ser Thr Pro
              75              80              85

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Glu Leu Phe Lys Leu Phe Leu Gln Thr His Glu Ala Thr Ser Phe Asn
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 Thr Arg Phe Gln Thr Ser Ala Ile Arg Arg Leu Thr Tyr Asp Ser Ser  
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 Val Ala Met Val Pro Phe Gly Pro Tyr Trp Lys Phe Val Arg Lys Leu  
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atc atg aac gac ctt ctc aac gcc acc act gta aac aag ttg agg cct 485  
 Ile Met Asn Asp Leu Leu Asn Ala Thr Thr Val Asn Lys Leu Arg Pro  
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ttg agg acc caa cag atc cgc aag ttc ctt agg gtt atg gcc caa ggc 533  
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 Ala Glu Ala Gln Lys Pro Leu Asp Leu Thr Glu Glu Leu Leu Lys Trp  
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acc aac agc acc atc tcc atg atg atg ctc ggc gag gct gag gag atc 629  
 Thr Asn Ser Thr Ile Ser Met Met Met Leu Gly Glu Ala Glu Glu Ile  
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aga gac atc gct cgc gag gtt ctt aag atc ttt ggc gaa tac agc ctc 677  
 Arg Asp Ile Ala Arg Glu Val Leu Lys Ile Phe Gly Glu Tyr Ser Leu  
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act gac ttc atc tgg cca ttg aag cat ctc aag gtt gga aag tat gag 725  
 Thr Asp Phe Ile Trp Pro Leu Lys His Leu Lys Val Gly Lys Tyr Glu  
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 Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe Asp Pro Val Val Glu Arg  
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 Val Lys Glu Thr Phe Arg Met His Pro Pro Leu Pro Val Val Lys Arg  
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 Lys Cys Thr Glu Glu Cys Glu Ile Asn Gly Tyr Val Ile Pro Glu Gly  
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gca ttg att ctc ttc aat gta tgg caa gta gga aga gac ccc aaa tac 1253  
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gcc aaa gtt agc atg gaa gag aga gcc ggc ctc act gtt cca agg gca 1541  
 Ala Lys Val Ser Met Glu Glu Arg Ala Gly Leu Thr Val Pro Arg Ala  
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cat agt ctt gtc tgt gtt cca ctt gca agg atc ggc gtt gca tct aaa 1589  
 His Ser Leu Val Cys Val Pro Leu Ala Arg Ile Gly Val Ala Ser Lys  
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Pro Asn Pro Pro Ser Pro Lys Pro Arg Leu Pro Phe Ile Gly His Leu
          35          40          45

His Leu Leu Lys Asp Lys Leu Leu His Tyr Ala Leu Ile Asp Leu Ser
 50          55          60

Lys Lys His Gly Pro Leu Phe Ser Leu Tyr Phe Gly Ser Met Pro Thr
 65          70          75          80

Val Val Ala Ser Thr Pro Glu Leu Phe Lys Leu Phe Leu Gln Thr His
          85          90          95

Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile Arg Arg
          100          105          110

Leu Thr Tyr Asp Ser Ser Val Ala Met Val Pro Phe Gly Pro Tyr Trp
          115          120          125

Lys Phe Val Arg Lys Leu Ile Met Asn Asp Leu Leu Asn Ala Thr Thr
          130          135          140

Val Asn Lys Leu Arg Pro Leu Arg Thr Gln Gln Ile Arg Lys Phe Leu
          145          150          155          160

Arg Val Met Ala Gln Gly Ala Glu Ala Gln Lys Pro Leu Asp Leu Thr
          165          170          175

Glu Glu Leu Leu Lys Trp Thr Asn Ser Thr Ile Ser Met Met Met Leu
          180          185          190

Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile
          195          200          205

Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Trp Pro Leu Lys His Leu
          210          215          220

Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe
          225          230          235          240

Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile Val Arg
          245          250          255

Arg Arg Lys Asn Gly Glu Val Val Glu Gly Glu Val Ser Gly Val Phe
          260          265          270

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Leu Asp Thr Leu Leu Glu Phe Ala Glu Asp Glu Thr Met Glu Ile Lys  
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 Ile Thr Lys Asp His Ile Lys Gly Leu Val Val Asp Phe Phe Ser Ala  
 290 295 300  
 Gly Thr Asp Ser Thr Ala Val Ala Thr Glu Trp Ala Leu Ala Glu Leu  
 305 310 315 320  
 Ile Asn Asn Pro Lys Val Leu Glu Lys Ala Arg Glu Glu Val Tyr Ser  
 325 330 335  
 Val Val Gly Lys Asp Arg Leu Val Asp Glu Val Asp Thr Gln Asn Leu  
 340 345 350  
 Pro Tyr Ile Arg Ala Ile Val Lys Glu Thr Phe Arg Met His Pro Pro  
 355 360 365  
 Leu Pro Val Val Lys Arg Lys Cys Thr Glu Glu Cys Glu Ile Asn Gly  
 370 375 380  
 Tyr Val Ile Pro Glu Gly Ala Leu Ile Leu Phe Asn Val Trp Gln Val  
 385 390 395 400  
 Gly Arg Asp Pro Lys Tyr Trp Asp Arg Pro Ser Glu Phe Arg Pro Glu  
 405 410 415  
 Arg Phe Leu Glu Thr Gly Ala Glu Gly Glu Ala Gly Pro Leu Asp Leu  
 420 425 430  
 Arg Gly Gln His Phe Gln Leu Leu Pro Phe Gly Ser Gly Arg Arg Met  
 435 440 445  
 Cys Pro Gly Val Asn Leu Ala Thr Ser Gly Met Ala Thr Leu Leu Ala  
 450 455 460  
 Ser Leu Ile Gln Cys Phe Asp Leu Gln Val Leu Gly Pro Gln Gly Gln  
 465 470 475 480  
 Ile Leu Lys Gly Gly Asp Ala Lys Val Ser Met Glu Glu Arg Ala Gly  
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Pro Pro Ser Pro Phe Phe Arg Leu Pro Ile Ile Gly His Met His Met
          35          40          45

Leu Gly Pro Leu Leu His Gln Ser Phe His Asn Leu Ser His Arg Tyr
 50          55          60

Gly Pro Leu Phe Ser Leu Asn Phe Gly Ser Val Leu Cys Val Val Ala
 65          70          75          80

Ser Thr Pro His Phe Ala Lys Gln Leu Leu Gln Thr Asn Glu Leu Ala
          85          90          95

Phe Asn Cys Arg Ile Glu Ser Thr Ala Val Lys Lys Leu Thr Tyr Glu
          100          105          110

Ser Ser Leu Ala Phe Ala Pro Tyr Gly Asp Tyr Trp Arg Phe Ile Lys
          115          120          125

Lys Leu Ser Met Asn Glu Leu Leu Gly Ser Arg Ser Ile Asn Asn Phe
 130          135          140

Gln His Leu Arg Ala Gln Glu Thr His Gln Leu Leu Arg Leu Leu Ser
 145          150          155          160

Asn Arg Ala Arg Ala Phe Glu Ala Val Asn Ile Thr Glu Glu Leu Leu
          165          170          175

Lys Leu Thr Asn Asn Val Ile Ser Ile Met Met Val Gly Glu Ala Glu
          180          185          190

Glu Ala Arg Asp Val Val Arg Asp Val Thr Glu Ile Phe Gly Glu Phe
          195          200          205

Asn Val Ser Asp Phe Ile Trp Leu Phe Lys Lys Met Asp Leu Gln Gly
 210          215          220

Phe Gly Lys Arg Ile Glu Asp Leu Phe Gln Arg Phe Asp Thr Leu Val
 225          230          235          240

Glu Arg Ile Ile Ser Lys Arg Glu Gln Thr Arg Lys Asp Arg Arg Arg
          245          250          255

Asn Gly Lys Lys Gly Glu Gln Gly Ser Gly Asp Gly Ile Arg Asp Phe
          260          265          270

Leu Asp Ile Leu Leu Asp Cys Thr Glu Asp Glu Asn Ser Glu Ile Lys
          275          280          285

Ile Gln Arg Val His Ile Lys Ala Leu Ile Met Asp Phe Phe Thr Ala
 290          295          300

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Gly Thr Asp Thr Thr Ala Ile Ser Thr Glu Trp Ala Leu Val Glu Leu  
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 Val Lys Lys Pro Ser Val Leu Gln Lys Val Arg Glu Glu Ile Asp Asn  
 325 330 335  
 Val Val Gly Lys Asp Arg Leu Val Glu Glu Ser Asp Cys Pro Asn Leu  
 340 345 350  
 Pro Tyr Leu Gln Ala Ile Leu Lys Glu Thr Phe Arg Leu His Pro Pro  
 355 360 365  
 Val Pro Met Val Thr Arg Arg Cys Val Ala Glu Cys Thr Val Glu Asn  
 370 375 380  
 Tyr Val Ile Pro Glu Asp Ser Leu Leu Phe Val Asn Val Trp Ser Ile  
 385 390 395 400  
 Gly Arg Asn Pro Lys Phe Trp Asp Asn Pro Leu Glu Phe Arg Pro Glu  
 405 410 415  
 Arg Phe Leu Lys Leu Glu Gly Asp Ser Ser Gly Val Val Asp Val Arg  
 420 425 430  
 Gly Ser His Phe Gln Leu Leu Pro Phe Gly Ser Gly Arg Arg Met Cys  
 435 440 445  
 Pro Gly Val Ser Leu Ala Met Gln Glu Val Pro Ala Leu Leu Gly Ala  
 450 455 460  
 Ile Ile Gln Cys Phe Asp Phe His Val Val Gly Pro Lys Gly Glu Ile  
 465 470 475 480  
 Leu Lys Gly Asp Asp Ile Val Ile Asn Val Asp Glu Arg Pro Gly Leu  
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Met Leu Val Glu Leu Ala Val	
1 5	
act cta ttg ctc att gct ctc ttc tta cac ttg cgt cca aca cct act	160
Thr Leu Leu Leu Ile Ala Leu Phe Leu His Leu Arg Pro Thr Pro Thr	
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gca aaa tca aag gct ctt cgc cac ctt cca aat cca cca agc cct aaa	208
Ala Lys Ser Lys Ala Leu Arg His Leu Pro Asn Pro Pro Ser Pro Lys	
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cca cgt ctt cca ttc ata ggt cat ctt cac ctt ttg gat aac cca ctt	256
Pro Arg Leu Pro Phe Ile Gly His Leu His Leu Leu Asp Asn Pro Leu	
40 45 50 55	
ctt cac cac act ctt atc aag tta gga aag cgt tat ggc cct ttg tac	304
Leu His His Thr Leu Ile Lys Leu Gly Lys Arg Tyr Gly Pro Leu Tyr	
60 65 70	
act ctt tac ttt ggt tcc atg cct acc gtt gtt gca tcc act cct gac	352
Thr Leu Tyr Phe Gly Ser Met Pro Thr Val Val Ala Ser Thr Pro Asp	
75 80 85	
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Leu Phe Lys Leu Phe Leu Gln Thr His Glu Ala Thr Ser Phe Asn Thr	
90 95 100	
aga ttc caa acc tct gct att agt cgt ctt acc tat gac aac tct gtt	448
Arg Phe Gln Thr Ser Ala Ile Ser Arg Leu Thr Tyr Asp Asn Ser Val	
105 110 115	
gct atg gtt cca ttt gca cct tat tgg aag ttt att aga aag ctt atc	496
Ala Met Val Pro Phe Ala Pro Tyr Trp Lys Phe Ile Arg Lys Leu Ile	
120 125 130 135	
atg aac gac ttg ctc aac gcc acc act gtt aac aaa ttg agg cca ttg	544
Met Asn Asp Leu Leu Asn Ala Thr Thr Val Asn Lys Leu Arg Pro Leu	
140 145 150	
agg agc cga gaa atc ctt aag gtt ctt aag gtc atg gct aat agt gct	592
Arg Ser Arg Glu Ile Leu Lys Val Leu Lys Val Met Ala Asn Ser Ala	
155 160 165	
gaa act caa cag cca ctt gat gtc act gag gag ctt ctc aag tgg aca	640
Glu Thr Gln Gln Pro Leu Asp Val Thr Glu Glu Leu Leu Lys Trp Thr	
170 175 180	
aac agc aca atc tct acc atg atg ttg ggt gag gcc gaa gag gtt aga	688
Asn Ser Thr Ile Ser Thr Met Met Leu Gly Glu Ala Glu Glu Val Arg	
185 190 195	
gat att gct cgt gat gtt ctt aag atc ttt gga gaa tat agt gtt aca	736
Asp Ile Ala Arg Asp Val Leu Lys Ile Phe Gly Glu Tyr Ser Val Thr	
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aga act gag gag att ttc aat aag tat gat cct atc att gaa aag gtt	832
Arg Thr Glu Glu Ile Phe Asn Lys Tyr Asp Pro Ile Ile Glu Lys Val	
235 240 245	
atc aag aaa cga caa gag att gtg aac aaa aga aaa aat gga gaa atc	880
Ile Lys Lys Arg Gln Glu Ile Val Asn Lys Arg Lys Asn Gly Glu Ile	
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Val Glu Gly Glu Gln Asn Val Val Phe Leu Asp Thr Leu Leu Glu Phe	
265 270 275	
gca caa gat gag acc atg gag atc aaa att aca aag gaa caa atc aag	976
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Gly Leu Val Val Asp Phe Phe Ser Ala Gly Thr Asp Ser Thr Ala Val	
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Ser Thr Glu Trp Thr Leu Ser Glu Leu Ile Asn Asn Pro Arg Val Leu	
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Val Asp Glu Ser Asp Val Gln Asn Leu Pro Tyr Ile Lys Ala Ile Val	
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Lys Glu Ala Phe Arg Leu His Pro Pro Leu Pro Val Val Lys Arg Lys	
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Cys Thr Gln Glu Cys Glu Ile Asp Gly Tyr Val Val Pro Glu Gly Ala	
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Leu Ile Leu Phe Asn Val Trp Ala Val Gly Arg Asp Pro Lys Tyr Trp	
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Val Lys Pro Leu Glu Phe Arg Pro Glu Arg Phe Ile Glu Asn Val Gly	
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Glu Gly Glu Ala Ala Ser Ile Asp Leu Arg Gly Gln His Phe Thr Leu	
425 430 435	

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 475 480 485

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Pro Asn Pro Pro Ser Pro Lys Pro Arg Leu Pro Phe Ile Gly His Leu  
 35 40 45

His Leu Leu Asp Asn Pro Leu Leu His His Thr Leu Ile Lys Leu Gly  
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Lys Arg Tyr Gly Pro Leu Tyr Thr Leu Tyr Phe Gly Ser Met Pro Thr  
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Val Val Ala Ser Thr Pro Asp Leu Phe Lys Leu Phe Leu Gln Thr His  
 85 90 95

Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile Ser Arg  
 100 105 110

Leu Thr Tyr Asp Asn Ser Val Ala Met Val Pro Phe Ala Pro Tyr Trp  
 115 120 125  
 Lys Phe Ile Arg Lys Leu Ile Met Asn Asp Leu Leu Asn Ala Thr Thr  
 130 135 140  
 Val Asn Lys Leu Arg Pro Leu Arg Ser Arg Glu Ile Leu Lys Val Leu  
 145 150 155 160  
 Lys Val Met Ala Asn Ser Ala Glu Thr Gln Gln Pro Leu Asp Val Thr  
 165 170 175  
 Glu Glu Leu Leu Lys Trp Thr Asn Ser Thr Ile Ser Thr Met Met Leu  
 180 185 190  
 Gly Glu Ala Glu Glu Val Arg Asp Ile Ala Arg Asp Val Leu Lys Ile  
 195 200 205  
 Phe Gly Glu Tyr Ser Val Thr Asn Phe Ile Trp Pro Leu Asn Lys Phe  
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 Lys Phe Gly Asn Tyr Asp Lys Arg Thr Glu Glu Ile Phe Asn Lys Tyr  
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 Lys Arg Lys Asn Gly Glu Ile Val Glu Gly Glu Gln Asn Val Val Phe  
 260 265 270  
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 Gly Thr Asp Ser Thr Ala Val Ser Thr Glu Trp Thr Leu Ser Glu Leu  
 305 310 315 320  
 Ile Asn Asn Pro Arg Val Leu Lys Lys Ala Arg Glu Glu Ile Asp Ser  
 325 330 335  
 Val Val Gly Lys Asp Arg Leu Val Asp Glu Ser Asp Val Gln Asn Leu  
 340 345 350  
 Pro Tyr Ile Lys Ala Ile Val Lys Glu Ala Phe Arg Leu His Pro Pro  
 355 360 365  
 Leu Pro Val Val Lys Arg Lys Cys Thr Gln Glu Cys Glu Ile Asp Gly  
 370 375 380  
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 Gly Arg Asp Pro Lys Tyr Trp Val Lys Pro Leu Glu Phe Arg Pro Glu  
 405 410 415

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